

## CLAIMS

What is Claimed is:

1. A system for preserving a human or human-compatible harvested organ in need of preservation, resuscitation or evaluation during a preservation period prior to implantation comprising:
- 5
- (a) containment means for containing said organ in communication with a fluid media comprising (i) whole blood or leukocyte-depleted whole blood compatible with said organ and (ii) a preservation solution;
- (b) delivery means for delivering said fluid media to at least one major vessel of said organ;
- 10
- (c) means for carrying said fluid media away from said organ;
- (d) temperature control means for maintaining the temperature of said organ at a normothermic temperature of about 20°C to about 37°C;
- (e) pressure control means for controlling the pressure of said fluid media;
- 15
- (f) oxygenation means for oxygenating at least a part of said fluid media;
- (g) filtering means for removing unwanted filtrate from said fluid media;
- (h) flow control means for controlling the flow of at least a part of said fluid media; and
- 20
- (i) means for supplying chemical substances selected from the group consisting of mannitol, dextrose, sodium chloride, potassium chloride, insulin, calcium chloride, sodium bicarbonate, monocarboxylic fatty acids and epinephrine.
2. A system according to Claim 1 wherein said fluid media surrounds the exterior of said organ.
- 25
3. A system according to Claim 1 wherein said system further includes a divider to separate said fluid media from said organ.

DOE-2010-204990

4. A system according to Claim 1 wherein said fluid media delivery means includes a centrifugal pump.
5. A system according to Claim 1 wherein said fluid media delivery means includes a pulsatile pump.
- 5 6. A system according to Claim 1 wherein said oxygenation means includes a membrane oxygenator.
7. A system according to Claim 1 wherein said system further includes portable energy storage and supply means.
8. A system according to Claim 7 wherein said system is self-contained and  
10 portable.
9. A system according to Claim 1 further including a rechargeable power supply for powering the system.
10. A system according to Claim 1 wherein the harvested organ is selected from the group consisting of a heart, kidney, liver, pancreas, lung, small intestine, blood  
15 carrying vessel and myocutaneous free flap.
11. A system according to Claim 10 wherein said organ is maintained in a functioning state during said preservation period.
12. A system according to Claim 10 wherein said organ is a heart.
13. A system according to Claim 11 wherein said heart is maintained in a beating  
20 state.

- 15 17

102 18. A solution according to Claim 17 wherein said solution further comprises a  
 pharmaceutically active agent selected from the group consisting of heparin,  
 nitroglycerin, an ACE inhibitor, a beta blocker, a calcium channel blocker, a  
 5 <sup>cell</sup> cytoprotective agent, an antioxidant, an anti-fungal agnt, an anti-viral agent, an  
 anti-bacterial agent, an immunosuppressive agent, a nonsteroidal anti-  
 inflammatory agent, a steroid, vitamins and mixtures thereof.

19. A solution according to Claim 18 wherein said solution further includes <sup>new</sup> <sub>add</sub>  
 insulin.

10 20. A solution according to Claim 18 wherein said solution further includes a  
 complement neutralizer.

21. A solution according to Claim 18 wherein said metabolizable carbohydrate is  
 selected from the group consisting of dextrose, glucose, and mixtures thereof.

15 22. A solution according to Claim 18 wherein said solution further includes at least  
 one fatty acid.

20 23. A method of preserving a human or human-compatible harvested organ in a  
 functioning state during a preservation period prior to implantation comprising:

- (a) providing an organ in need of preservation;
- (b) providing containment means for said organ;
- (c) providing a preservation fluid media; said fluid media comprising:
  - (i) whole blood or leukocyte-depleted whole blood that is  
 compatible with said organ; and
  - (ii) a preservation solution comprising:
    - (a) a metabolizable carbohydrate;
    - (b) sodium chloride;

25

-68-

Cont  
A3

- (c) potassium;
- (d) calcium;
- (e) magnesium;
- (f) bicarbonate; epinephrin; and insulin;

in per meants  
per me to b

5

- (d) delivering said fluid media to at least one major vessel of said contained functioning organ while said organ is maintained at a normothermic temperature of about 20°C. to about 37°C.

24. A method according to Claim 23 wherein said media includes heparin.

10

25. A method according to Claim 23 wherein said media further includes a pharmaceutically active agent selected from the group consisting of nitroglycerin, an ACE inhibitor, a beta blocker, a calcium channel blocker, a cytoprotective agent, an antioxidant, an anti-fungal agnt, an anti-viral agent, an anti-bacterial agent, an immunosuppressive agent, a nonsteroidal anti-inflammatory agent, a steroid, and mixtures thereof.

15

26. A method according to Claim 23 wherein said media further includes at least one fatty acid.

20

27. A method according to Claim 26 wherein said method includes the further step of delivering said fluid media to the exterior of said organ.

28. A method according to Claim 23 wherein said method includes the further step of filtering said fluid media as metabolic products from said organ accumulate in said fluid media.

25

29. A method according to Claim 23 wherein said method includes the further step of oxygenation at least a part of said fluid media.

DOE-2010-2049560

- add AS